Effects of a Lifestyle Medicine Elective on Self-Care Behaviors in Preclinical Medical Students

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Abstract

The purpose of this study was to explore the impact of a lifestyle medicine elective on medical students' self-care behaviors. From fall, 2015, through spring, 2017, a lifestyle medicine elective was offered to first and second year medical students. Acquisition of data was approved by the IRB. Students attended four group sessions, two at the beginning and two at the end of the elective. At the first session, information about the effects of lifestyle on mental and physical health was presented. Students completed screening instruments to assess their own physical activity, nutrition, anxiety, and depression. At the next class, students received their scores. They chose one of three focus groups: nutrition, physical activity or stress management and set a specific goal in that area. At the end of the elective, students attended two group sessions, which focused on patient cases. They again completed the screening instruments, and received their scores. They also evaluated the course. Sixty-three students signed the consent form and provided data. Comparison of baseline scores by gender revealed that women had statistically significant higher scores on the depression screener than men, and lower physical activity scores than men. Pre and post elective comparison in the whole group showed statistically significant improvements in nutrition, depression, and anxiety (all p < .05). Further analysis in the focus groups demonstrated that the stress management group's scores on anxiety were significantly improved. The nutrition group significantly lowered their fat consumption and increased their intake of fruits and vegetables (all p < .05). The physical activity group did not significantly increase their daily physical activity, although this analysis was limited by missing data and wide variability. Student evaluations of the course were positive. Medical students are able to make improvements in their own lifestyle behaviors while acquiring information that may be useful in later patient care.

Keywords Lifestyle · Medical students · Anxiety · Depression · Nutrition

The major contemporary physical and emotional illnesses are strongly influenced by the choices that people make, and the actions resulting from those choices. Accordingly, prevention and wellness have become frequent topics during patient-physician interactions (Musich et al. 2016). In addition to recommending biological therapies for chronic illnesses and pain, physicians are educating patients about staying healthy and avoiding illness (Olsen and Nesbitt 2010). In particular, the patient's life-style is evaluated for ways to minimize the chances of becoming ill. Smoking cessation, stress reduction, physical activity and diet are the major areas considered. This shift in focus has paid dividends, resulting in longer life spans and a higher quality of life for patients (Bize et al. 2007). Medicare and other insurance providers have recognized this fact and have encouraged and reimbursed physicians for emphasizing prevention (Hughes 2011; Goetzel et al. 2007). In summary, there is increased awareness that an individuals' lifestyle has profound implications for their morbidity and mortality.

The medical school curriculum has also changed over time in order to prepare the student for their expanding

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role as teacher and counselor (Center for Disease Control 2016). During the last 2 years of medical school, students observe primary care clinicians as they educate and guide their patients about adopting healthier lifestyles. They also participate in lecture and discussion sessions in which faculty teach students about the importance of lifestyle in caring for patients.

Recently, a consortium of academic institutions formed to broaden the education of future physicians in the area of lifestyle medicine (Muscato et al. 2015, 2018). However, opportunities for individual medical students to learn prevention and lifestyle medicine may be quite limited. In addition, there is little emphasis on students' personal health care behaviors during medical school although evidence supports an association between regular physical activity and lower burnout in medical students (Dyrbye et al. 2017).

It was the goal of this project to offer an opportunity to first and second year medical students, which focused on basic concepts of lifestyle medicine. The educational approach encouraged students to examine their own lifestyles and identify areas in which they could make improvements. Based on our experience with medical students, (McGrady et al. 2012; Brennan et al. 2012), it was predicted that even with the demands of medical school, students would be able to make meaningful improvements in their lifestyle during a semester long lifestyle medicine elective.

The hypotheses were: (1) all participants will demonstrate statistically significant improvements in all of the study variables, (2) participants in the focus groups will demonstrate significant improvements from baseline in their specific area, either nutrition, stress reduction or activity.

Method

Participants

First and second year students at a medium sized, midwestern medical school were informed through the academic website about the availability of a one semester Lifestyle Medicine elective. Approximately 175 students were eligible each year the elective was offered, for a total of 350 eligible students. Participating students (N = 65) signed up at the beginning of the semester and received credit after completion of course requirements. The study was approved by the Institutional Review Board (IRB), and all participants were offered the consent form to sign, but this was not necessary for the students to receive credit. Two students did not consent to participate in the study and so their data was not included in the analysis.

Sixty-three students gave informed consent and provided data during the four semesters during which the elective was offered. Twenty students chose the nutrition focus group, 14 chose physical activity and 29 chose stress management.

Procedures (See Fig. 1)

Figure 1 illustrates the organization of the elective. At the first session, faculty (AM and DB) explained the schedule and requirements in order to receive credit. This was followed by a general lecture on the prevalence of chronic illnesses in the general population, and the relationship of the major lifestyle factors on development of todays' major illnesses. Then, the effects of lifestyle on personal mental and physical well-being of medical students was emphasized. Students completed screening instruments which assessed physical activity level, nutrition, anxiety and depression; these are described below.
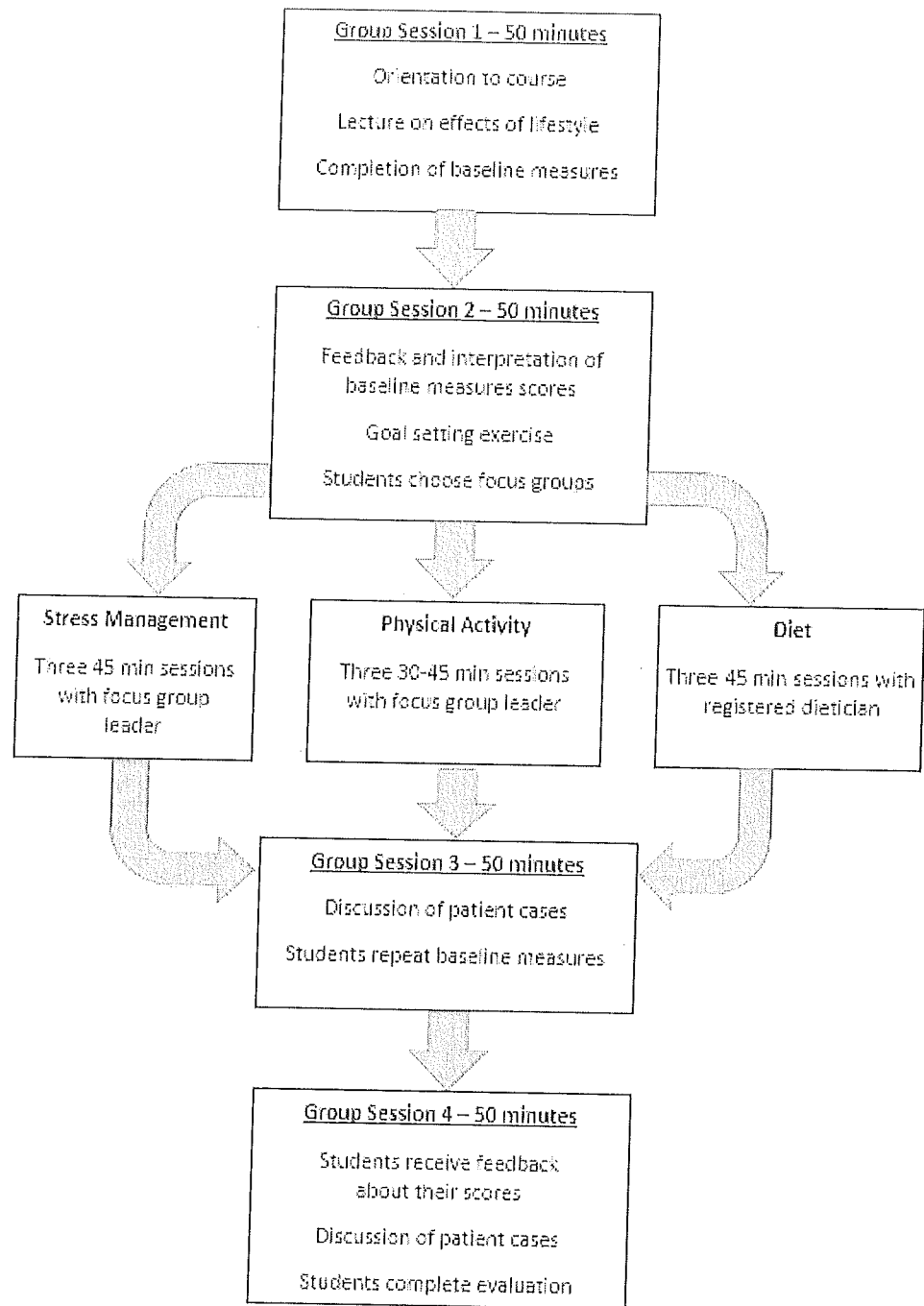
During the second group session, students received their scores on the screeners. If they did not sign the consent form, they received their data, but their information is not included in the analysis. The faculty provided interpretation of the scores, including normal ranges. It was emphasized that the focus groups were not support groups nor were they designed to substitute for mental health services.

After receiving their scores, students chose the focus group in which they wanted to participate. No student was assigned to a group. Students were guided through a goal setting exercise utilizing the SMART goal framework, (which is used widely in business) (Lawlor and Hornyak 2012) for their specific area. A SMART goal is characterized by these attributes: specific, measurable, achievable, realistic and time-based. During the following 8 weeks, students met with the focus group leader and worked on their goal in either physical activity, nutrition, or stress management. Focus group leaders were experts in the specific area.

Students in the stress management group attended three 45-min sessions, directed for the most part on decreasing anxiety and to a lesser extent on improvement of symptoms of depression. Topics included identifying current major stressors and recognizing personal reactions to the stress of medical school. Skill building consisted of slow breathing, progressive relaxation, mindfulness and basic cognitive restructuring (Davis et al. 2008). Regular daily practice using phone apps or written materials was recommended, but not formally tracked.

In the physical activity group, students attended three meetings with the focus group leader. Students further refined their physical activity goal, particularly the intermediate steps required. It was emphasized that increasing their daily physical activity did not necessarily mean "going to the gym and working out". Examples of increasing physical activity during the course of a normal day were suggested, such as climbing the hospital steps instead of taking the elevator or standing up to study. At least one "walk and talk"

Fig. 1 Flow chart for procedures in the elective

Group Session 1 – 50 minutes

Orientation to course

Lecture on effects of lifestyle

Completion of baseline measures

Group Session 2 – 50 minutes

Feedback and interpretation of baseline measures scores

Goal setting exercise

Students choose focus groups

Stress Management

Three 45 min sessions with focus group leader

Physical Activity

Three 30-45 min sessions with focus group leader

Diet

Three 45 min sessions with registered dietician

Group Session 3 – 50 minutes

Discussion of patient cases

Students repeat baseline measures

Group Session 4 – 50 minutes

Students receive feedback about their scores

Discussion of patient cases

Students complete evaluation

session was conducted while walking on an indoor track to reinforce the fact that you could accomplish the same thing (talking) and being physically active at the same time.

Students in the nutrition group met with a registered dietician at least 3 times. A more detailed analysis of daily consumption of healthy and unhealthy foods was conducted. The dietician provided practical information about identifying high fat foods, choosing low fat foods based on students' tastes, and ways to increase consumption of fruits and vegetables without a significant increase in food costs.

Particular emphasis was placed on increasing fiber and complex carbohydrates and decreasing high calorie, low quality foods such as salty snacks.

After the 8 weeks allocated to the focus group meetings, students attended two group sessions. With the assistance of medical school faculty physicians, students discussed patient cases. The cases highlighted the effects of unhealthy lifestyle on wellbeing and then students designed treatment plans for the patients. Students completed the same assessments as they did at baseline and received a summary of

their second set of scores. They also completed an evaluation for the elective.

Measures

Physical activity was indexed in two ways: by the number of minutes per week of physical activity and by an online questionnaire (Physical Activity Policy 2009). The General Practice Physical Activity Questionnaire asks about time spent and type of aerobic physical activity. The website generates a category: inactive, moderately inactive, moderately active and active, based on time spent in activity each week. Students also were asked to track minutes of activity per week using personal devices, such as smart phones. The devices counted all activity, not specifically aerobic activity.

Nutrition was assessed by simple screeners for fruits/vegetables, and fat consumption (Block et al. 2000). These consisted of lists of fruits and vegetable and fat containing food consumed on a daily, weekly or less frequent basis. A score was generated based on consumption per week of fruits/vegetables and the percentage of saturated fats in the diet. Those scores indicated whether students were consuming too few fruits/vegetables and /or too high fat.

Anxiety was assessed by the GAD-7 (Spitzer et al. 2006). This self-report screener is composed of 7 items on which subjects record the frequency of anxiety symptoms over the previous 2 weeks. Scores range from 0 to 21. Scores of 5, 10, and 15 are taken as the cut-off points for mild, moderate and severe anxiety, respectively. Using the threshold score of 10, it has a sensitivity of 89% and a specificity of 82% for the diagnosis of Generalized Anxiety Disorder.

Depression was assessed by the PHQ-9 (Kroenke and Spitzer 2002). This screener has 9 items and subjects rate the frequency of depressed symptoms over the previous two weeks. Scores can range from 0 to 27. Scores of 5, 10, 15 and 20 are taken as the cut off points for mild, moderate, moderately severe, and severe depression. Using 10 as a threshold score, the PHQ-9 was found to have a sensitivity of 88% and a specificity of 89% for Major Depressive Disorder.

For evaluation of the course, students answered two questions using a four-point Likert scale. One item asked students to rate the usefulness of the course; a value of 1

indicated not useful and 4 equaled very useful. The second item asked how likely they were to recommend the course to others. They also had the opportunity to report the most important part of the elective for them.

Analysis

Statistical analysis consisted of descriptive statistics, paired t-tests, and analysis of variance. Significance level was set at $p < .05$.

Results

Baseline Data

Review of the baseline data showed that ten students scored in the clinical range (≥ 14) on the anxiety measure and nine of those ten entered the stress management focus group. One student scored in the clinical range on the PHQ-9 and that student entered the stress management focus group.

Forty-one students had a diet high in saturated fat (equal or greater than 15 on the nutrition screener, total fat about 35% of calories); 15 students of those entered the nutrition group, 8 the activity group and 18 chose the stress management group. Twelve students were eating too few fruits and vegetables (score of 10 or less on the nutrition screener indicating 1–2 servings per day); seven entered the nutrition group, 1 the activity group and 4 chose the stress management group.

With regard to activity, baseline data was available for 38 subjects from the General Practice Activity Questionnaire. Four were classified as being physically inactive (less than 1 h of physical activity per week). Three of the 4 inactive subjects chose to be in the activity focus group. The remaining subject chose the nutrition focus group. Baseline activity measured in minutes from 43 students' devices ranged from sedentary to more than 300 min of physical activity per week.

Table 1 shows the descriptive statistics for the whole group divided by gender.

Table 1 Comparison between men and women at baseline

Variable	N	Men (N=24)	Women (N=39)	F score (df)	p value
Age	61	23.6 (1.3)	23.3 (1.5)	0.8 (1,59)	0.38
Activity (minutes per week)	43	246 (115)	156 (125)	5.3 (1.29)	.026
Fruits/vegetables score	63	14.5 (5.2)	14.7 (4.9)	0.01 (1.61)	0.91
Fat score	62	19.8 (8.1)	17.3 (8.3)	1.3 (1.60)	0.25
Anxiety score	63	5.8 (6.7)	7.5 (5.5)	1.2 (1.61)	0.28
Depression score	61	3.4 (2.0)	6.9 (4.7)	11.8 (1.59)	.001

Values are mean (SD)

There were 39 women and 24 men whose average age was 23.4 years. Men and women were contrasted on the dependent variables. There were significant differences between the genders on depression and activity. Women had higher scores on the depression screener (i.e. more depressed; p = .001). Men reported significantly more minutes of activity per week (p = .03).

Post Elective Results for the Entire Group

At the end of the elective, three students scored in the clinical range for anxiety and all three were in the stress management group. No student's score on the depression inventory was above the clinical cut off. Thirty-two students were consuming more fat than the recommended guidelines; seven in the nutrition group, eight in the activity group and 17 in the stress management group. Four students, all from the stress management group ate fewer than the recommended servings of fruits and vegetables. At the end of the elective, no subjects were in the inactive group (less than 1 h of physical activity per week) as measured from the Activity Questionnaire.

Table 2 shows the pre and post elective means and standard deviations for the entire group in all of the variables. The number of responders for each variable is not consistent because some students did not complete every inventory. There was no effect of gender on the post program results. Improvement was noted in all variables and significant improvements (paired t-tests) were documented in consumption of fats, fruits, depression and anxiety. Physical activity

increased from 184 to 220 min per week, but this change was not significant (p = .09). In the nutrition category, fruit consumption increased significantly as indicated by the increase from a score of 14.5 to 17.0 (p = .001); fat score decreased from 18.0 to 15.3 (p = .001). Most of the improvement in nutrition for the whole group was due to increases in consumption of dark bread and fiber and decreases in cold cuts, margarine and salty snacks such as corn chips. Post elective scores on the anxiety and depression measures were significantly decreased compared to baseline. Anxiety as measured by the GAD decreased from 7.0 to 5.2 (p < .001) and depression scores decreased from 5.6 to 4.8 (p < .04).

Baseline and Post Elective Comparison Analysis by Focus Group

We then compared the pre and post scores for relevant variables within the three groups. Results from this analysis are shown in Table 3. At post-test, the stress management group's scores on anxiety and depression showed a decrease from baseline; the change in the anxiety score was significant (p < .017). The nutrition group consumed significantly less fat (p < .001) and more fruit (p < .001) compared to baseline. Students in the physical activity group increased their minutes of activity. However, analyses of the physical activity group data was limited by the small number of students who chose this focus area and the large variability in minutes of activity.

Evaluation of the Program

Fifty-eight students evaluated the elective. For the elective as a whole, the average score was 3.3 out of a maximum of 4 (4 = very useful). Fifty-five of 58 students said they would definitely recommend the elective to another student and three said maybe they would recommend it. Sample comments regarding personal value of the course included the following: "Having structure and a goal to work toward in trying to reduce stress.", "Establishing a daily motive (for nutrition) and being guided by a professional", "Learning techniques to modify my behavior gave me more confidence".

Table 2 Comparison of baseline and post elective scores in entire group

Variable	N	Baseline	Post elective	t score	p value
Activity (minutes per week)	38	184 (128)	220 (152)	1.8	.09
Fruits/vegetables score	62	14.5 (4.8)	17 (4.7)	3.8	.001
Fat score	61	18 (8.1)	15.3 (8,0)	3.6	.001
Anxiety score	62	7.0 (6.0)	5.2 (4.1)	2.7	.009
Depression score	60	5.6 (4.3)	4.8 (3.8)	2.1	.04

Values are mean (SD); df = N–1

Table 3 Comparison of baseline and post elective values in the focus groups

Focus group	Variable	N	Pre	Post	t value	p value
Activity	Minutes of activity	9	146 (75)	201 (99)	1.16	.28
Nutrition	Fruits/score vegetables	19	13.6 (4.5)	17.5 (4.0)	4.4	.001
	Fat score	19	18.6 (8.7)	13.3 (5.9)	3.6	.002
Stress management	Anxiety score	29	10.0 (7.0)	7.1 (4.7)	2.5	.017
	Depression score	28	6.8 (5.4)	5.4 (4.3)	1.8	.08

Values are means (SD); df = N–1

Discussion

The results of this study demonstrate that medical students are interested in learning more about lifestyle medicine, and being educated in ways to change their own lifestyle behaviors. Further, students are able to make meaningful improvements in their own nutrition, physical activity or ways of managing stress over the course of one semester. Taken as a group, the students in this study achieved positive changes in all three focus areas (nutrition, physical activity and stress management). They demonstrated statistically significant improvements in consumption of more fruits and vegetables, lowered fat consumption. In addition they reduced anxiety and symptoms of depression. The elective was open to all students in contrast to other studies that emphasized interventions for groups at high risk for mental health problems based on current anxiety or depression (Conley et al. 2017; Brennan et al. 2016).

Analysis of results from each focus group showed that most students who were below threshold (or above the normal) values in particular areas wanted to be in the group that would directly address this deficit. They made this decision after receiving their scores on the screening questionnaires. By the end of the elective, students in each of the focus groups demonstrated improvement in the area on which they chose to work. This finding is consistent with other research showing that personal, specific feedback can motivate subjects to modify their behavior (Abraham and Michie 2008).

Students asked for change methods in other areas but we encouraged them to focus on one change at a time to increase their chances for success. The whole group changed all variables in the direction of more healthy behaviors but the focus groups sustained major changes in their area of focus.

Student evaluations of the elective revealed that the students found the course quite useful and would recommend it to classmates. Perhaps a required curriculum segment could present information about lifestyles to medical students either in the classroom or using online platforms. We used a face-to-face format, while others have developed web-based electives. Frates et al. (2017) reported that students who completed an elective on lifestyle medicine were more likely to consider changing their behavior. In addition, as we have suggested herein, students can benefit personally if given the opportunity to apply what they learn about lifestyle medicine and healthy behaviors to their own lives.

Some limitations to the current study include the relatively small number of participating students compared to the class as a whole and the uneven distribution of students in the focus groups. In addition, the results may have been more striking if enrollment had been limited to students whose scores were not in the normal range, but any preclinical medical student was eligible to enroll. Complete data was not available for all subjects because participation was voluntary and some subjects neglected to complete all inventories. The activity measure collated by the students themselves (minutes of physical activity) captured all activity, instead of aerobic activity and therefore, the range of scores hampered emergence of statistical significance. We refer to the PHQ scores as depression and the GAD as anxiety because these are standardized instruments to screen for these factors; however it should be mentioned that that students did not undergo a diagnostic evaluation for either anxiety or depression.

Further research should include longer-term follow up on the subjects over the course of their medical school careers. In particular, it would be useful to know whether the positive lifestyles changes were maintained following this initial intervention, which took place in the preclinical years of medical school. It would also be interesting to learn whether subjects, following their success in modifying one focus area, went on to attempt changes in other lifestyle areas. Also, to be considered is the incorporation of lifestyle medicine components, including change strategies across the entire scope of the required medical school curriculum.

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